THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method for measuring the maturity or cell wall thickening of a sample of cellulosic fibre, the method including the steps of:

a) exposing the sample of fibre to polarised light;

b) capturing one or more images of the sample through crossed polar lenses and compensator plate so that the image(s) include interference colours from the sample; and

c) conducting computer analysis on the image(s) captured in step b) to determine the maturity of the cellulosic fibre by comparing the image(s) interference data to maturity reference data.

2. The method according to claim 1, wherein step c) involves determining the area of particular interference colours in the image(s).

3. The method according to claim 2, wherein the area of interference colours in the image(s) is determined by analysing the areas of any one or a combination of yellow, red, green and blue in the image(s).

4. The method according to claim 2, wherein the image(s) captured are a digital image(s), or are converted into a digital image(s), and the area of particular interference colours appearing in the image(s) is determined by analysing the number of pixels in the image(s) of a particular colour.

5. The method according to any one of claims 1-4, wherein conducting computer analysis involves using an algorithm to compare the interference colours of the image(s) captured with reference maturity data to determine an average value and/or distribution of maturity values for the sample.

6. The method according to any one of claims 1 to 5, wherein step c) involves determining a total area of fibre appearing in the image(s).

7. The method according to claim 6, wherein the total area of fibre in the image(s) is determined by any one or a combination of the following:

i) the number of fibres in the image(s);

ii) the length of fibre in the image(s);

iii) the ribbon width of the fibre in the image(s); and

iv) the number of convolutions or twists per unit length of the fibre in the image(s).

8. The method according to claim 7, whereby when image(s) captured are colour, the method involves converting the image(s) in colour into monochrome image(s) in determining any one of features i) to iv).

9. The method according to claim 7, whereby when the image(s) are captured as digital image(s), or are converted into digital image(s), the method involves pixel analysis in determining any one of features i) to iv).

10. The method according to any one of the preceding claims, further including determining the degree of attack on the fibre of the sample using computer analysis of the images to determine the number and dimensions of surface fractures.

11. The method according to claim 10, wherein the number and dimensions of surface fractures of the fibres is determined by pixel anaylsis.

12. The method according to any one of claims 1 to 11, wherein the image(s) of the fibre captured in step b) is/are captured while the fibre is randomly spread over a

microscope slide at a density that does not mitigate expression of the interference colours.

13. The method according to claim 12, wherein the density of fibre ranges from 200 to 300 $\mu g/cm^2$.

14. The method according to any one of claims 1 to 13, wherein the image(s) capture the fibres at a magnification ranging from 1.5 to 5 times its normal size.

15. The method according to any one of claims 1 to 14, wherein the method also includes capturing a series of images, each of a different segment of the sample fibres, and that an average value and/or fibre maturity distribution is determined from the images.

16. The method according to any of of claims 4, 9 and 11, wherein the size of each pixel is equal to or greater than 6.45µm x 6.45µm.

17. An apparatus for measuring the maturity or cell wall thickening of a sample of cellulosic fibre, the apparatus including:

a) an optical light path having a polarised light source that can be directed through a compensator plate before being transmitted through a sample of fibre being tested followed by a polarising lens that is crossed to the direction of polarization of the polarized light source;

b) an image capturing means for capturing one or more images of the sample of fibres located in the optical light path so that the image(s) include interference colours of the sample; and

c) a computer capable of analysing the image(s) to determine the maturity or cell wall thickening of the fibre by comparing the image(s) interference colour data to reference maturity data.

18. The apparatus according to claim 17, wherein the reference maturity data is in the form of colour interference data.

19. The apparatus according to claim 17 or 18, wherein the image capturing means record the image(s) digitally and that the size of each pixel be equal to or greater than 6.45μm X 6.45μm.

20. The apparatus according to claim 19, wherein the computer is capable of carrying out pixel digital image analysis.

21. The apparatus according to any one of claims 17 to 20, wherein the computer be capable of analysing the image(s) to determine any one or a combination of the following characteristics of the fibre:

i) the average maturity and/or a maturity distribution of the sample of fibre;

ii) the number of fibres in each image;

iii) the ribbon width of the fibre in the image(s); and

iv) the number of convolutions or twists per unit length of fibre in the image(s).

22. The apparatus according to any one of claims 17 to 21, wherein the optical light path includes: a tungsten filament bulb or white light emitting diode; two polarising lenses that are crossed at approximately 90°; and a compensator plate for enhancing the interference colours.

23. The apparatus according to any one of claims 17 to 22, wherein the image(s) are captured under a magnification ranging from 1.5 to 5 times their actual size.